Writing Complex Conjugates (ALG.CN.06)

Write the complex conjugate of each complex number. Then multiply the number by its complex conjugate.

1. $1 - 6i$

$\mathbf{1 + 6i;\ 37}$

2. $-4 + 3i$

$\mathbf{-4 - 3i;\ 25}$

3. $-7i$

$\mathbf{7i;\ 49}$

4. $\sqrt{10}i$

$\mathbf{-\sqrt{10}i;\ 10}$

5. $-2.5i$

$\mathbf{2.5i;\ 6.25}$

6. $\frac{8}{3}i$

$\mathbf{-\frac{8}{3}i;\ \frac{64}{9}}$

7. $-3 - \sqrt{2}i$

$\mathbf{-3 + \sqrt{2}i;\ 11}$

8. $1 + \sqrt{5}i$

$\mathbf{1 - \sqrt{5}i;\ 6}$

9. $\sqrt{-40}$

$\mathbf{-2\sqrt{10}i;\ 40}$

10. $3\sqrt{-6}$

$\mathbf{-3\sqrt{6}i;\ 54}$

11. $\sqrt{3} - 2i\sqrt{6}$

$\mathbf{\sqrt{3} + 2i\sqrt{6};\ 27}$

12. $-7\sqrt{2} + \frac{3}{2}i$

$\mathbf{-7\sqrt{2} - \frac{3}{2}i;\ \frac{401}{4}}$

13. What is the complex conjugate of a real number?

Since any real number can be written as $a + 0i$, its complex conjugate is $a - 0i$. The complex conjugate of a real number is the number itself.

14. Show that the complex conjugate of the sum of two complex numbers $\boldsymbol{a + bi}$ and $\boldsymbol{c + di}$ is the sum of their complex conjugates.

$(a + bi) + (c + di)$

$(a + c) + (b + d)i$

$(a + c) - (b + d)i$

$(a - bi) + (c - di)$

$(a + c) + (-b - d)i$

$(a + c) - (b + d)i$

15. Show that the complex conjugate of the product of two complex numbers $\boldsymbol{a + bi}$ and $\boldsymbol{c + di}$ is the product of their complex conjugates.

$(a + bi)(c + di)$

$ac + (ad)i + (bc)i + dbi^2$

$(ac - db) + (ad + bc)i$

$(ac - db) - (ad + bc)i$

$(a + bi)(c + di)$

$(a - bi)(c - di)$

$ac - (ad)i - (bc)i + dbi^2$

$(ac - db) - (ad + bc)i$